



BC69PA series

20 V, 2 A PNP medium power transistors

Rev. 8 — 11 December 2024

Product data sheet

1. General description

PNP medium power transistor in a SOT1061 (DFN2020-3) leadless very small Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- High current
- Three current gain selections
- High power dissipation capability
- Exposed heatsink for excellent thermal and electrical conductivity
- Leadless very small SMD plastic package with medium power capability
- AEC-Q101 qualified

3. Applications

- Linear voltage regulators
- High-side switches
- Battery-driven devices
- Power management
- MOSFET drivers
- Amplifiers

4. Quick reference data

Table 1. Quick reference data

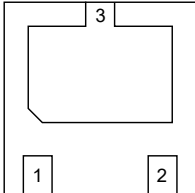
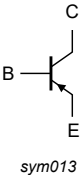
$T_{amb} = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	-20	V
I_C	collector current			-	-	-2	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1\text{ ms}$		-	-	-3	A
h_{FE}	DC current gain						
	BC69PA	$V_{CE} = -1\text{ V}$; $I_C = -500\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	85	-	375	
	BC69-16PA		[1]	100	-	250	
	BC69-25PA		[1]	160	-	375	

[1] pulsed; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$

5. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Transparent top view	 sym013
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BC69PA	-	plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body 2 x 2 x 0.65 mm	SOT1061
BC69-16PA			
BC69-25PA			

7. Marking

Table 4. Marking

Type number	Marking code
BC69PA	B3
BC69-16PA	BM
BC69-25PA	BN

8. Limiting values

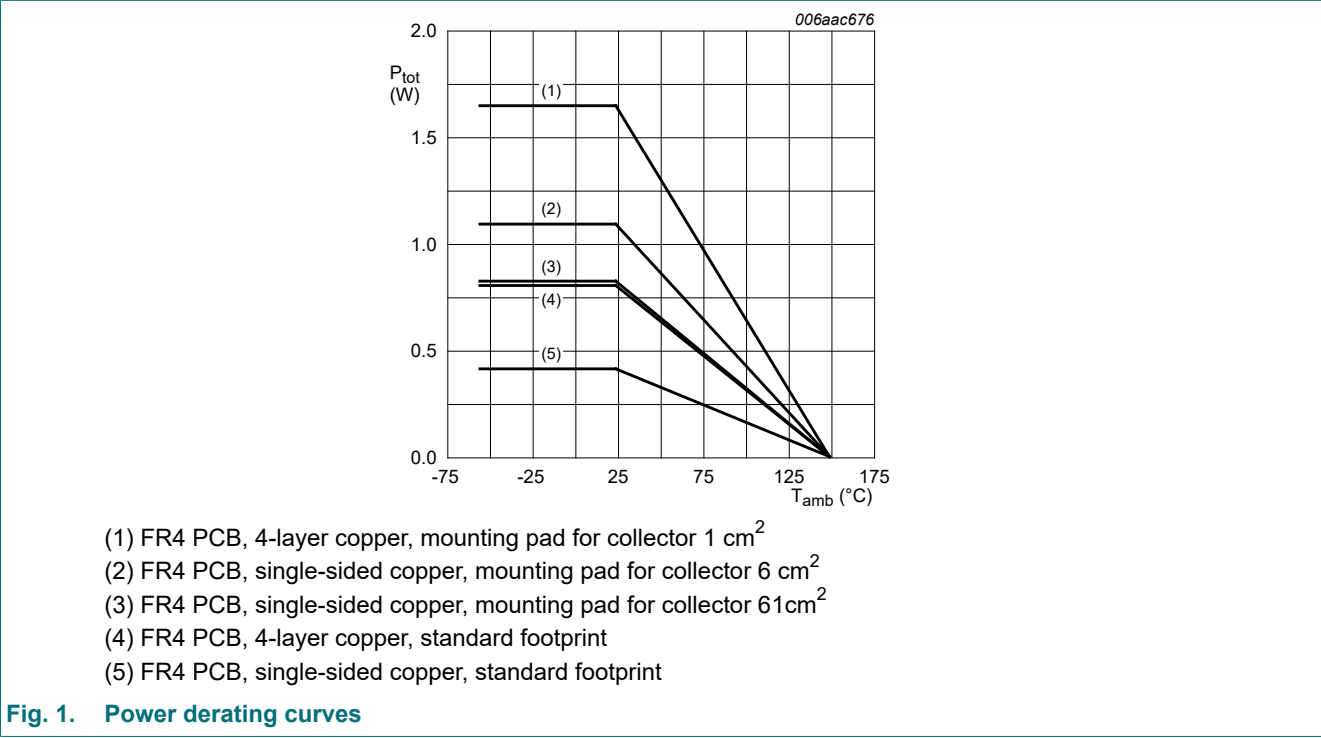
Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

$T_{amb} = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	-32	V
V_{CEO}	collector-emitter voltage	open base	-	-20	V
V_{EBO}	emitter-base voltage	open collector	-	-5	V
I_C	collector current		-	-2	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	-3	A
I_B	base current		-	-0.4	A
I_{BM}	peak base current	single pulse; $t_p \leq 1\text{ ms}$	-	-0.4	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	-	0.42 W
			[2]	-	0.83 W
			[3]	-	1.10 W
			[4]	-	0.81 W
			[5]	-	1.65 W
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	150	°C
T_{stg}	storage temperature		-65	150	°C

- [1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm².
- [3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm².
- [4] Device mounted on an FR4 PCB;4-layer copper, tin-plated and standard footprint
- [5] Device mounted on an FR4 PCB; single-sided copper; 4-layer copper, tin-plated, mounting pad for collector 1 cm².



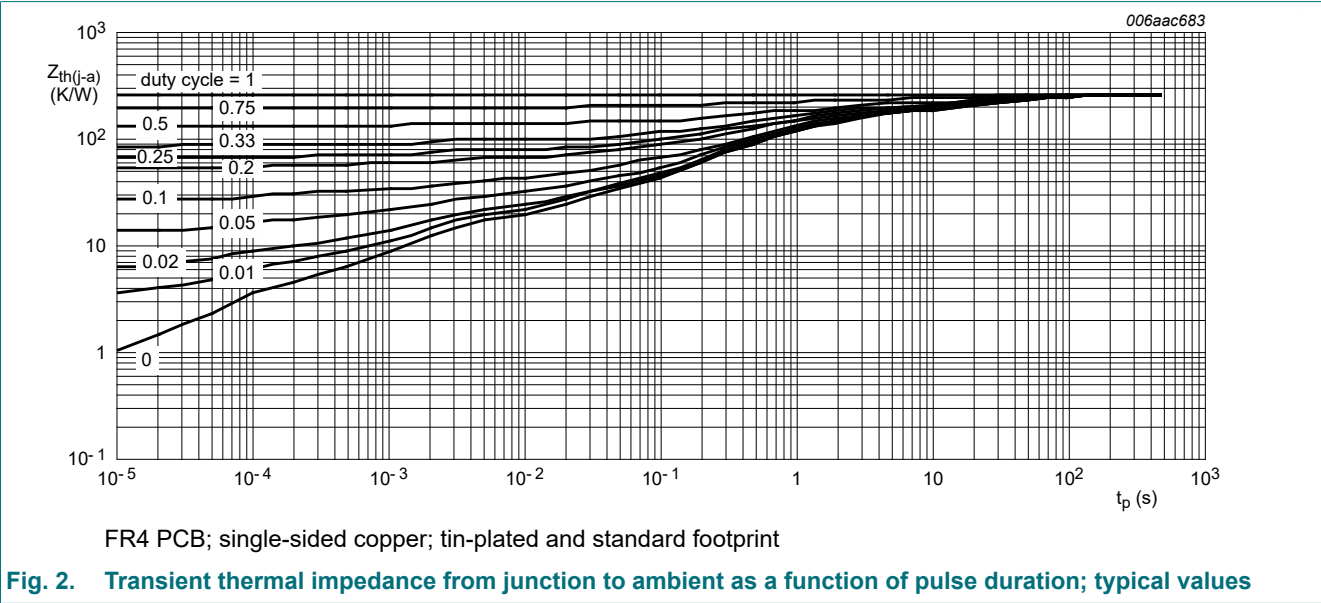
9. Thermal characteristics

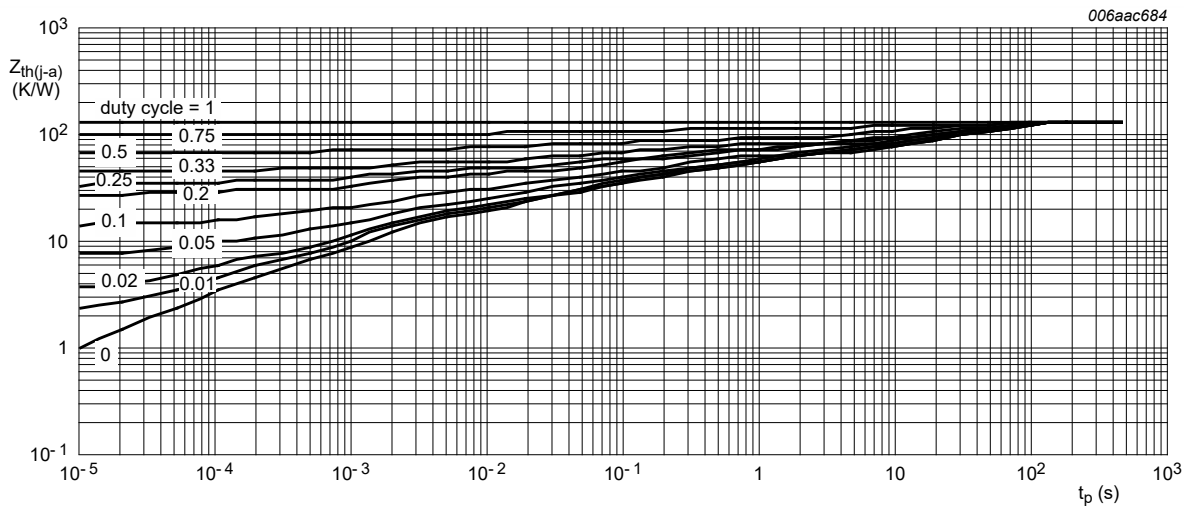
Table 6. Thermal characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	298	K/W
			[2]	-	-	151	K/W
			[3]	-	-	114	K/W
			[4]	-	-	154	K/W
			[5]	-	-	76	K/W
$R_{(j-sp)}$	thermal resistance from junction to solder point			-	-	20	K/W

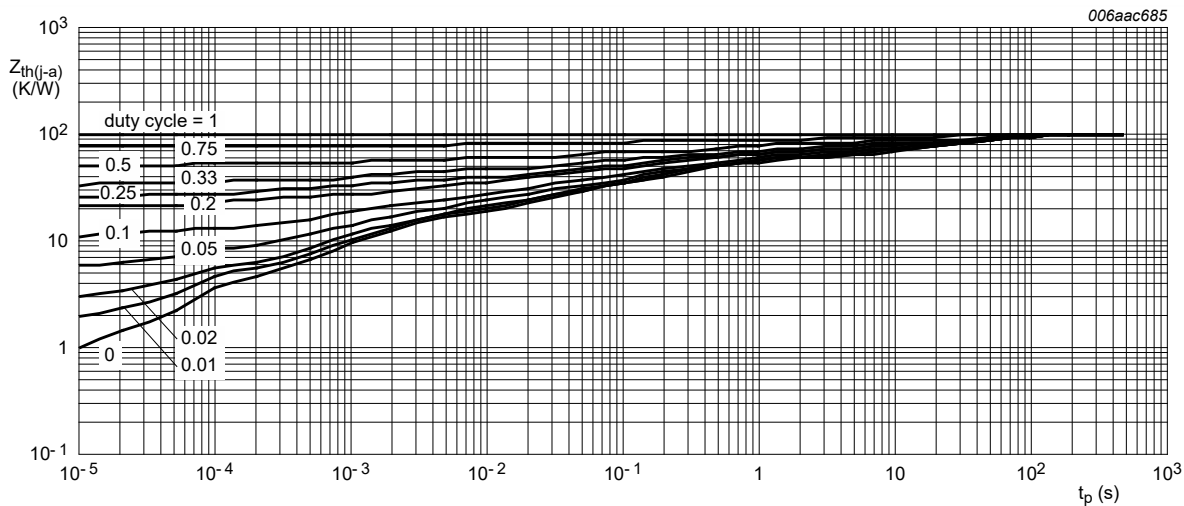
- [1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm².
[3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm².
[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.
[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated, mounting pad for collector 1 cm².





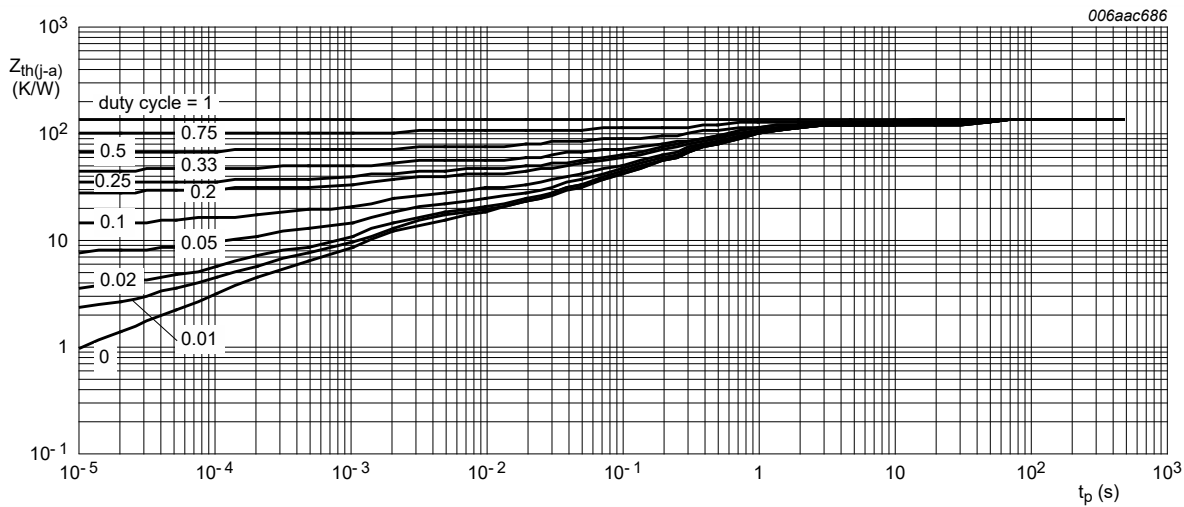
FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm²

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm²

Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, 4-layer copper, standard footprint

Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I _{CBO}	collector-base cut-off current	V _{CB} = -25 V; I _E = 0 A T _{amb} = 25 °C		-	-	-100	nA
		V _{CB} = -25 V; I _E = 0 A; T _j = 150 °C		-	-	-10	µA
I _{EBO}	emitter-base cut-off current	V _{EB} = -5 V; I _C = 0 A T _{amb} = 25 °C		-	-	-100	nA
h _{FE}	DC current gain						
	BC69PA	V _{CE} = -10 V; I _C = -5 mA T _{amb} = 25 °C	[1]	50	-	-	
		V _{CE} = -1 V; I _C = -500 mA T _{amb} = 25 °C	[1]	85	-	375	
		V _{CE} = -1 V; I _C = -1 A T _{amb} = 25 °C	[1]	60	-	-	
		V _{CE} = -1 V; I _C = -2 A T _{amb} = 25 °C	[1]	40	-	-	
	BC69-16PA	V _{CE} = -10 V; I _C = -5 mA T _{amb} = 25 °C	[1]	50	-	-	
		V _{CE} = -1 V; I _C = -500 mA T _{amb} = 25 °C	[1]	100	-	250	
		V _{CE} = -1 V; I _C = -1 A T _{amb} = 25 °C	[1]	60	-	-	
		V _{CE} = -1 V; I _C = -2 A T _{amb} = 25 °C	[1]	40	-	-	
	BC69-25PA	V _{CE} = -10 V; I _C = -5 mA T _{amb} = 25 °C	[1]	50	-	-	
		V _{CE} = -1 V; I _C = -500 mA T _{amb} = 25 °C	[1]	160	-	375	
		V _{CE} = -1 V; I _C = -1 A T _{amb} = 25 °C	[1]	60	-	-	
		V _{CE} = -1 V; I _C = -2 A T _{amb} = 25 °C	[1]	40	-	-	
	V _{CEsat}	I _C = -1 A; I _B = -100 mA T _{amb} = 25 °C	[1]	-	-	-0.5	V
		I _C = -2 A; I _B = -200 mA T _{amb} = 25 °C	[1]	-	-	-0.6	V
V _{BE}	base-emitter voltage	V _{CE} = -10 V; I _C = -5 mA T _{amb} = 25 °C	[1]	-	-	-0.7	V
		V _{CE} = -1 V; I _C = -1 A T _{amb} = 25 °C	[1]	-	-	-1	V
C _c	collector capacitance	V _{CB} = -10 V; I _E = i _e = 0 A; f = 1 MHz T _{amb} = 25 °C		-	28	-	pF
f _T	transition frequency	V _{CE} = -5 V; I _C = -50 mA; f = 100 MHz T _{amb} = 25 °C		40	140	-	MHz

[1] pulsed; t_p ≤ 300 µs; δ ≤ 0.02

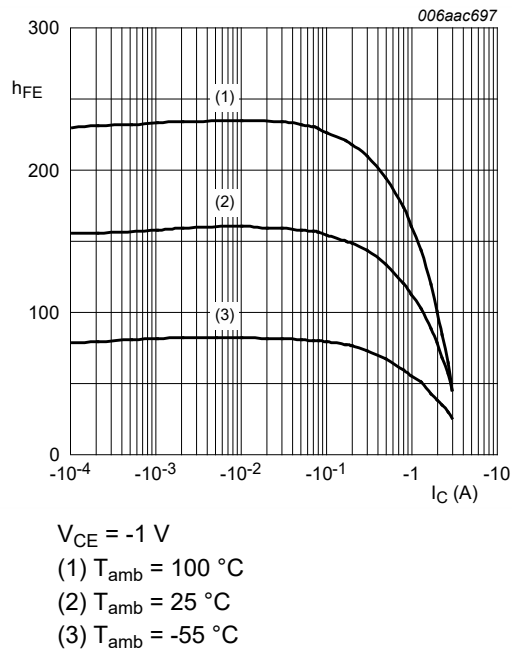


Fig. 7. hFE selection -16: DC current gain as a function of collector current; typical values

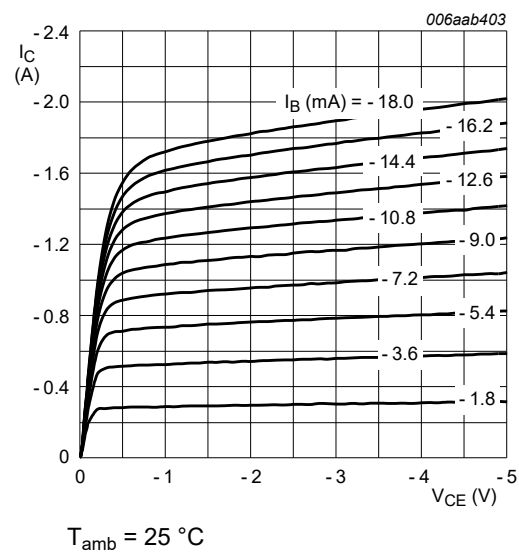


Fig. 8. hFE selection -16: Collector current as a function of collector-emitter voltage; typical values

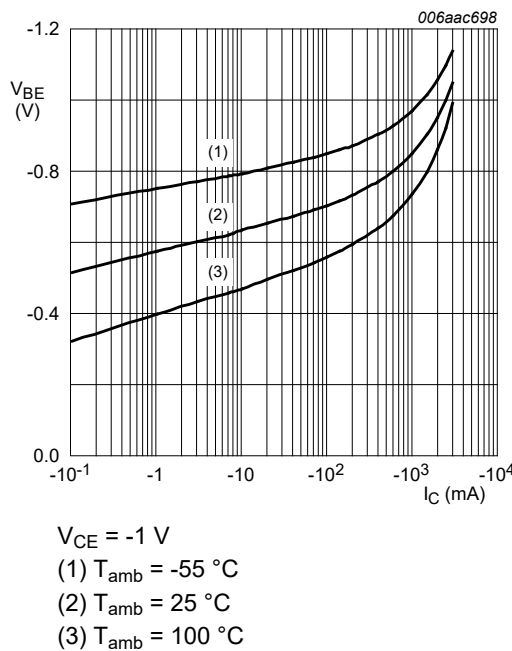


Fig. 9. hFE selection -16: Base-emitter voltage as a function of collector current; typical values

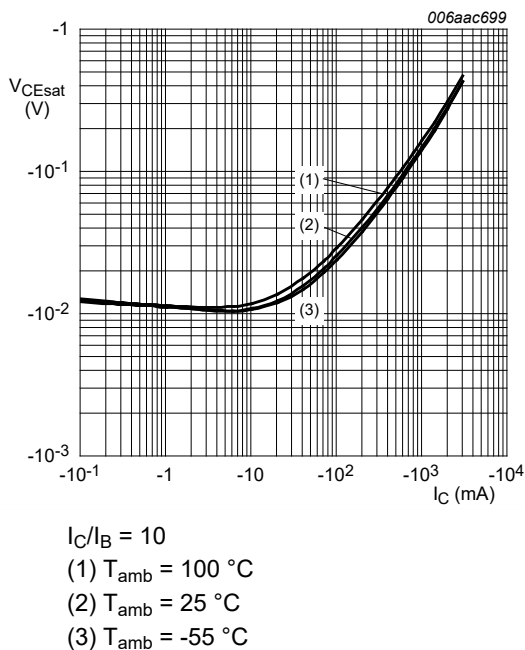


Fig. 10. hFE selection -16: Collector-emitter saturation voltage as a function of collector current; typical values

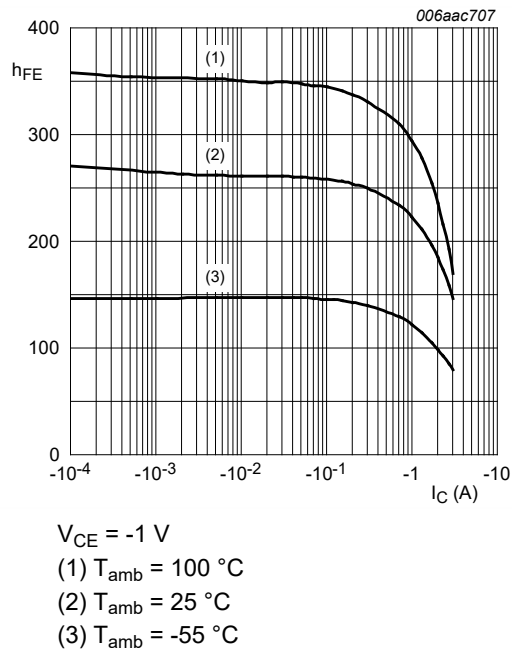


Fig. 11. hFE selection -25: DC current gain as a function of collector current; typical values

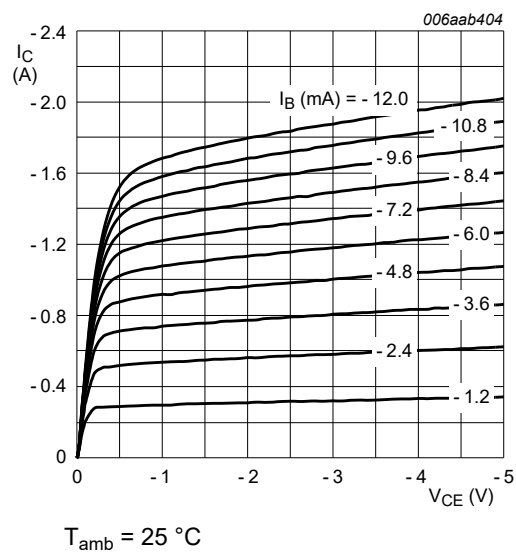


Fig. 12. hFE selection -25: Collector current as a function of collector-emitter voltage; typical values

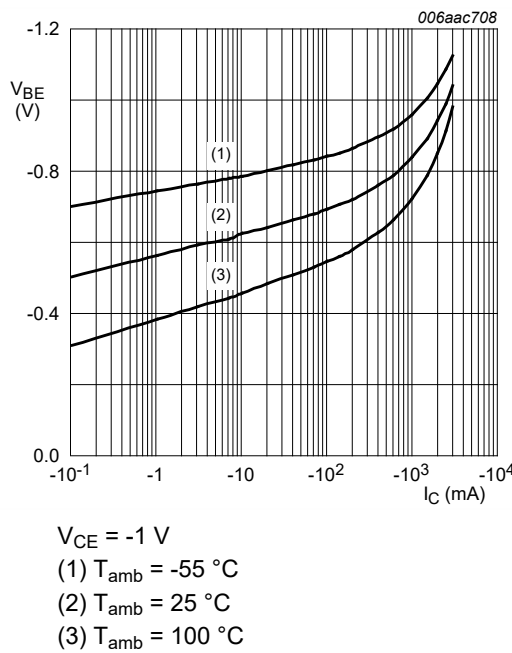


Fig. 13. hFE selection -25: Base-emitter voltage as a function of collector current; typical values

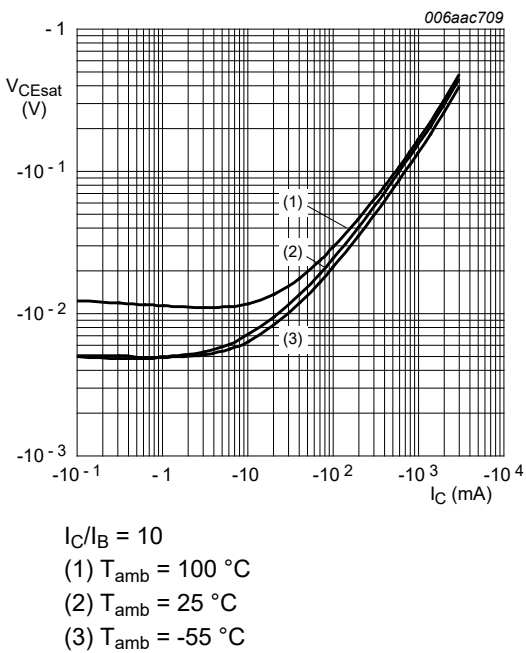


Fig. 14. hFE selection -25: Collector-emitter saturation voltage as a function of collector current; typical values

11. Test information

11.1. Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline

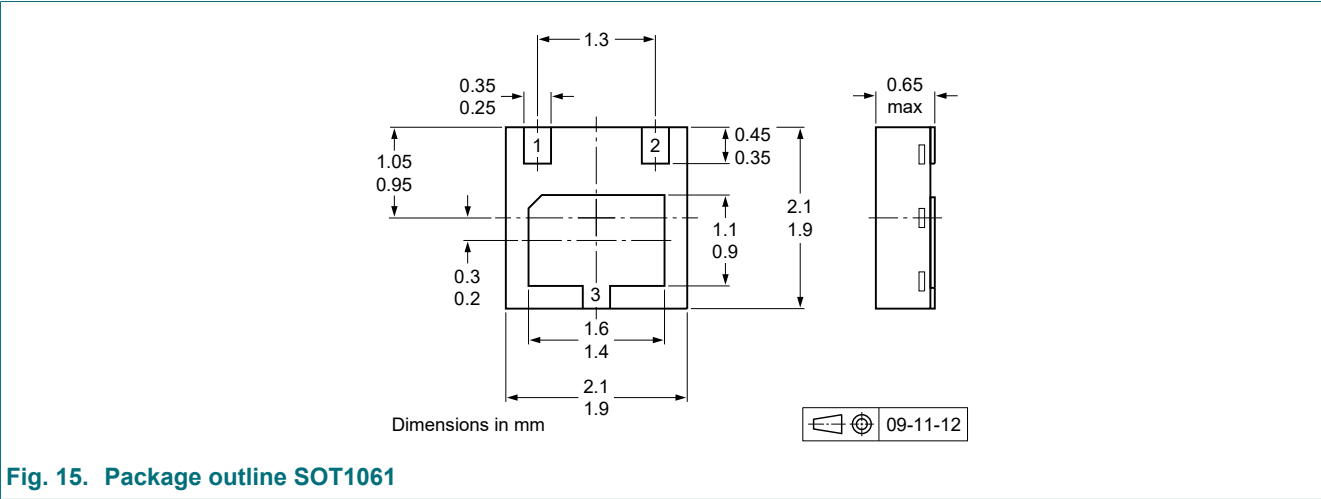


Fig. 15. Package outline SOT1061

13. Soldering

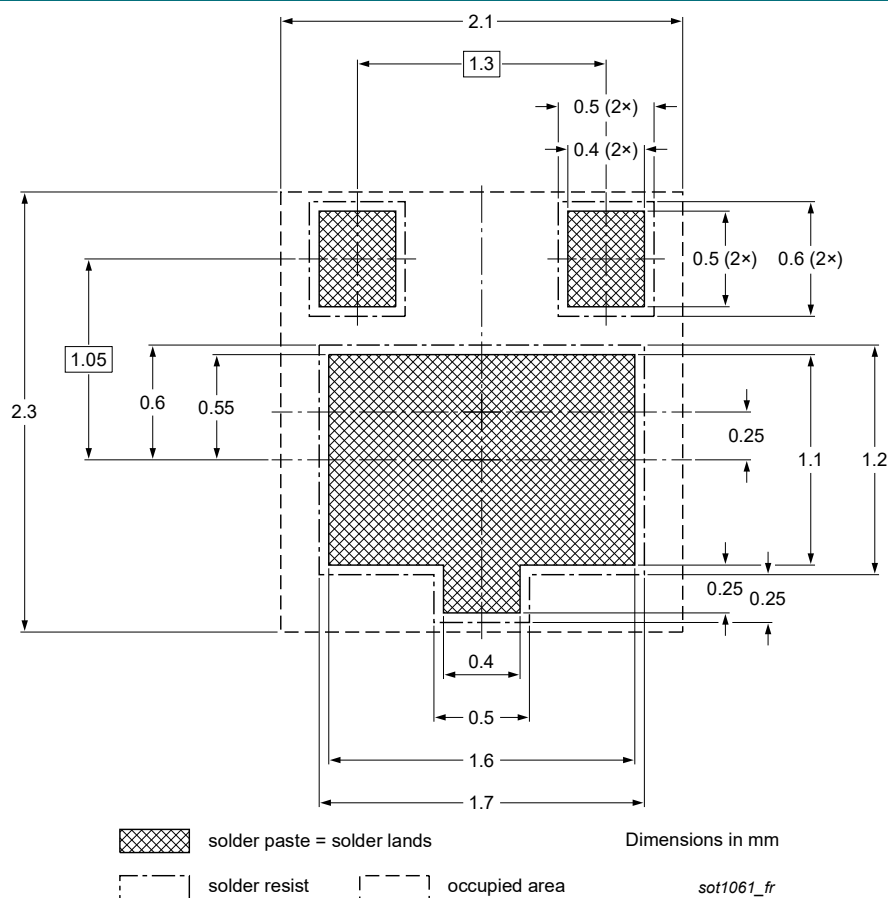


Fig. 16. Reflow soldering footprint for SOT1061

14. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC69PA_SER v.8	yyyymmdd	Product data sheet	-	BCP69_BC869_BC69PA v.7
Modifications:	- Data sheet separated into 3 data sheets - Section "Packing information" removed			
BCP69_BC869_BC69PA v.7	20111012	Product data sheet	-	BC869_6 BCP69_6
BC869_6	20041108	Product data sheet	-	BC869_5
BC869_5	20031202	Product specification	-	BC869_4
BC869_4	19990408	Product specification	-	BC869_3
BC869_3	19980716	Product specification	-	BC869_CNV_2
BC869_CNV_2	19970401	Product specification	-	-
BCP69_6	20081202	Product data sheet	-	BCP69_5
BCP69_5	20031125	Product specification	-	BCP69_4
BCP69_4	20021115	Product specification	-	BCP69_3
BCP69_3	19990408	Product specification	-	BCP69_CNV_2
BCP69_CNV_2	19970312	Product specification	-	-

15. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 11 December 2024

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